Optimal Health Care

LEADS TO OPTIMAL PERFORMANCE

Advanced Regenerative Therapy

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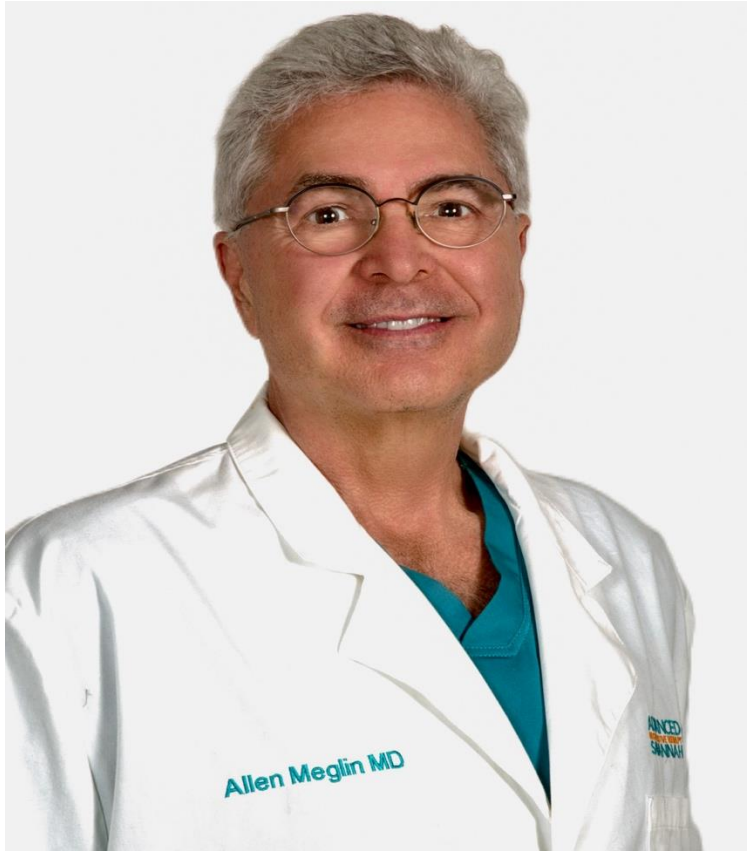


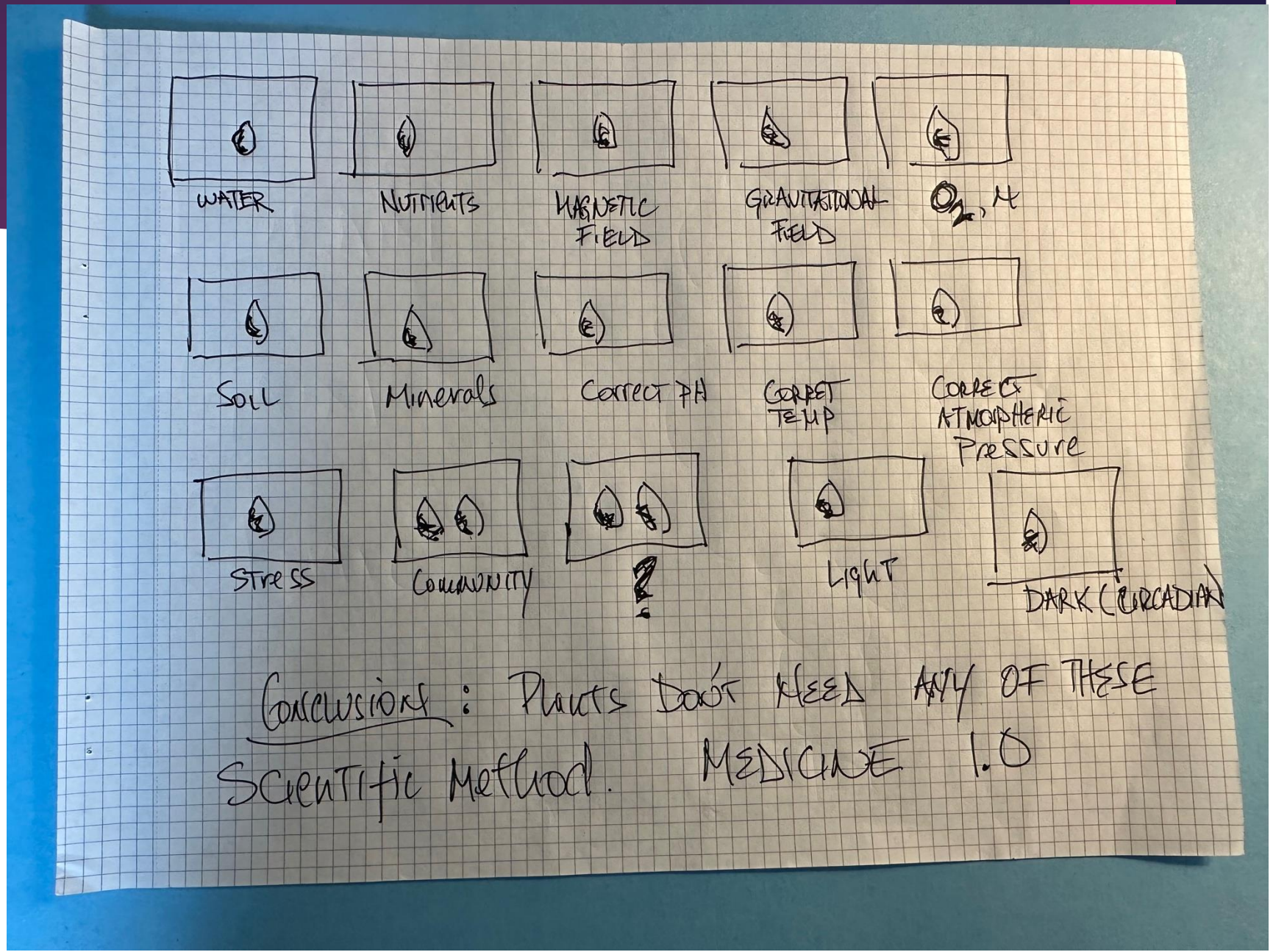
STATED OBJECTIVES

- Optimal Health: Definition
- Why are we not optimized?
- Professional athletes are closer than most, but often not optimized
- Complex systems require complex solutions
- Medicine 1.0 (Doctors are the problem)
- Medicine 2.0 (The problem is the problem)(Single point of failure)
- Medicine 3.0 (There isn't a problem, there's a solution)
- Medicine 4.0 (predictive and preemptive solutions)
- The Meglin 11
- It takes a village
- Multivariate Analysis, Multichannel Solutions : HBT and the concussion model
- Hyperbaric Therapy, Red Light, PEMF, Hormone Optimization, Peptides, Brain wave entrainment, Biologics

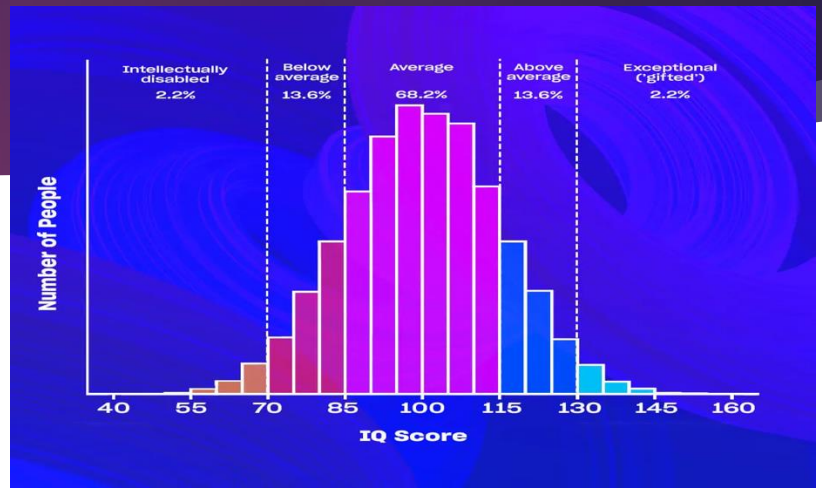
Medicine 1.0-3.x

- Pre-Medicine 1.0 : disease is caused by the Gods
- **Medicine 1.0** : disease conclusions based upon observations and guesswork. Humors cause disease. Miasmas. Food as medicine.
- **Medicine 2.0** : disease is caused by germs. Hypothesis, testing, scientific method. Highly successful. One variable at a time. Poor at chronic or complex disease.
- **Medicine 3.0** : chronic and complex disease require complex solutions

Medicine 2.0
fails complex problems like genetic and neurologic driven behavior



Medicine 2.0 : Evidence based medicine



- Wellness is the absence of disease
- Normal = Usual, Average, Typical, Standard
- Optimal = Most desirable or satisfactory
- Medicine 3.x = Personalized, precise, preventative, risk oriented including the risk of doing nothing. Optimization. Wellness emphasizes prevention over treatment. Unique individual. Informed patient directed care.

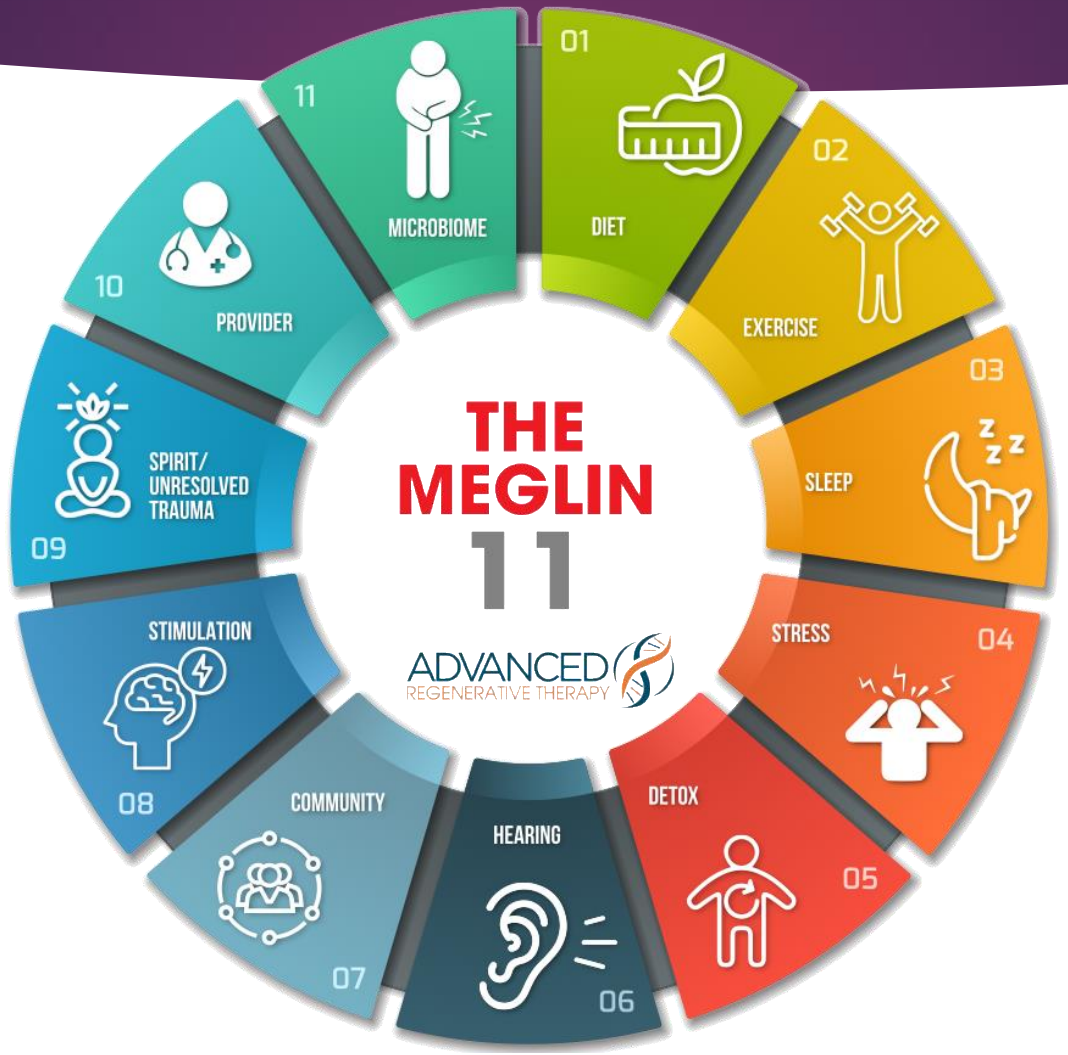
Change only when NECESSARY

Medicine 2.0	**Medicine 3.0**
Risk Ignorant	Risk acceptance
Presumes risk of doing nothing is zero	Risk/reward ratios
Evidence based medicine- one varible at a time	Prevention better than treatment
Presumes ACUTE disease	Required in chronic disease
insurance model	Focus on later years
Resistant to change	Requires change
Unhealthy Skepticism	Requires team mates
Lifespan centeric	Healthspan centric
Patient is passenger	Patient is the captain
	Need to overcome hyperbolic discounting

Medicine 3.0

- **Functional Medicine takes a village**
- DC
- Orthopod
- Sports Psychologist
- Trainer
- Strength Coach
- Physical Therapist
- Nutritionist

Complexity of Wellness



NHL Head Physicians 2022: 25/33

- **Chicago Blackhawks:** Michael Terry, MD, is an orthopedist at Northwestern Memorial Hospital in Chicago.
- **Florida Panthers:** Gautam Yagnik, MD, is a physician at the Miami Orthopedics & Sports Medicine Institute.
- Orthopods: 17
- Family: 2
- ER: 1
- EMT:1
- **IM: 1**
- Unknown:2

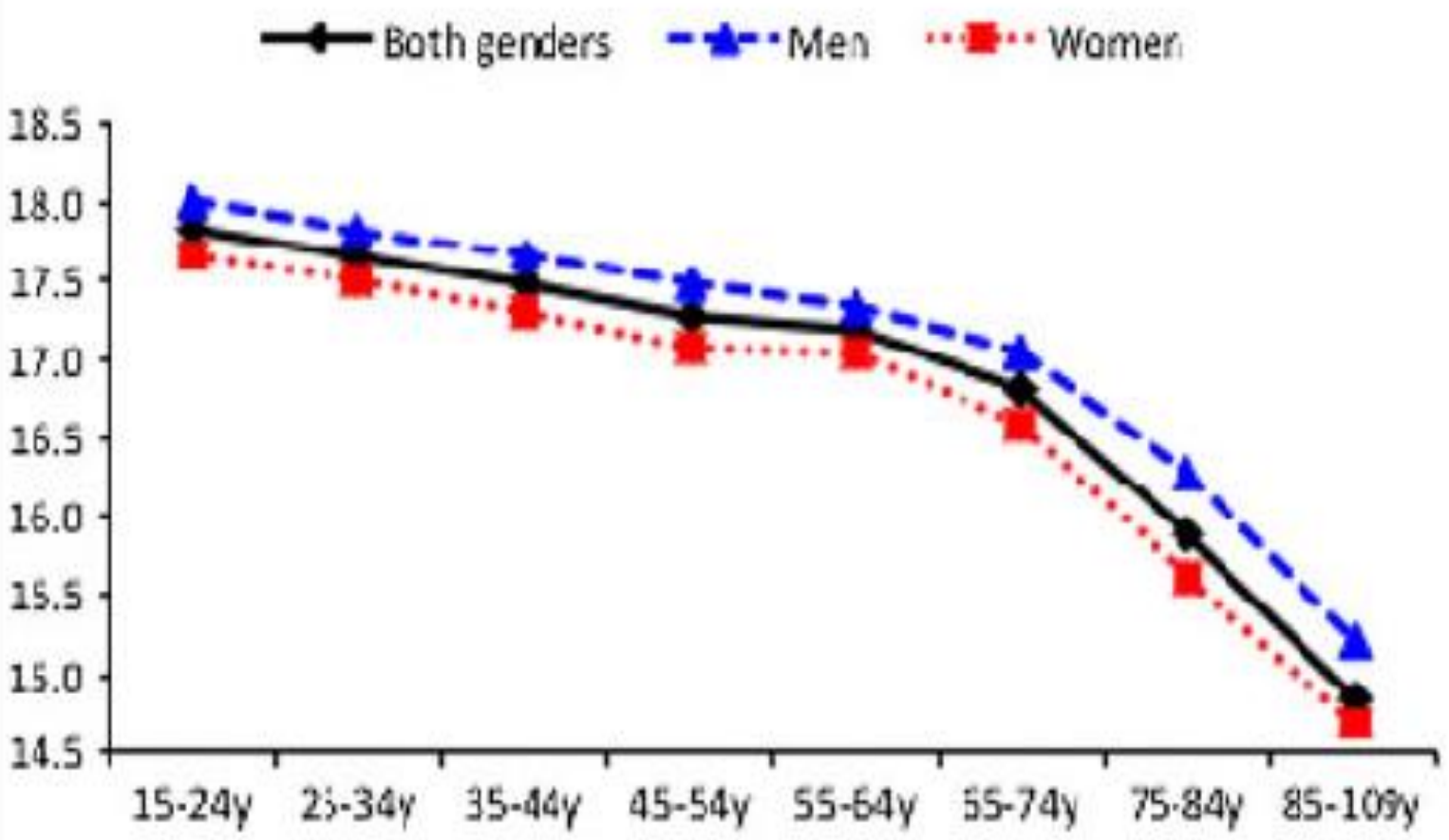
Professional Athlete Specific Issues

- Oxidative stress and hyperbolic discounting
- Diet/ Insufficient Recovery/Detox
- Gut Microbiome
- Circadian Rhythm and Sleep Disorder
- Emotional Stress/ Community/Self Determination
- Unresolved Trauma/Spirit
- Provider-Confidentiality Issues
- Concussion

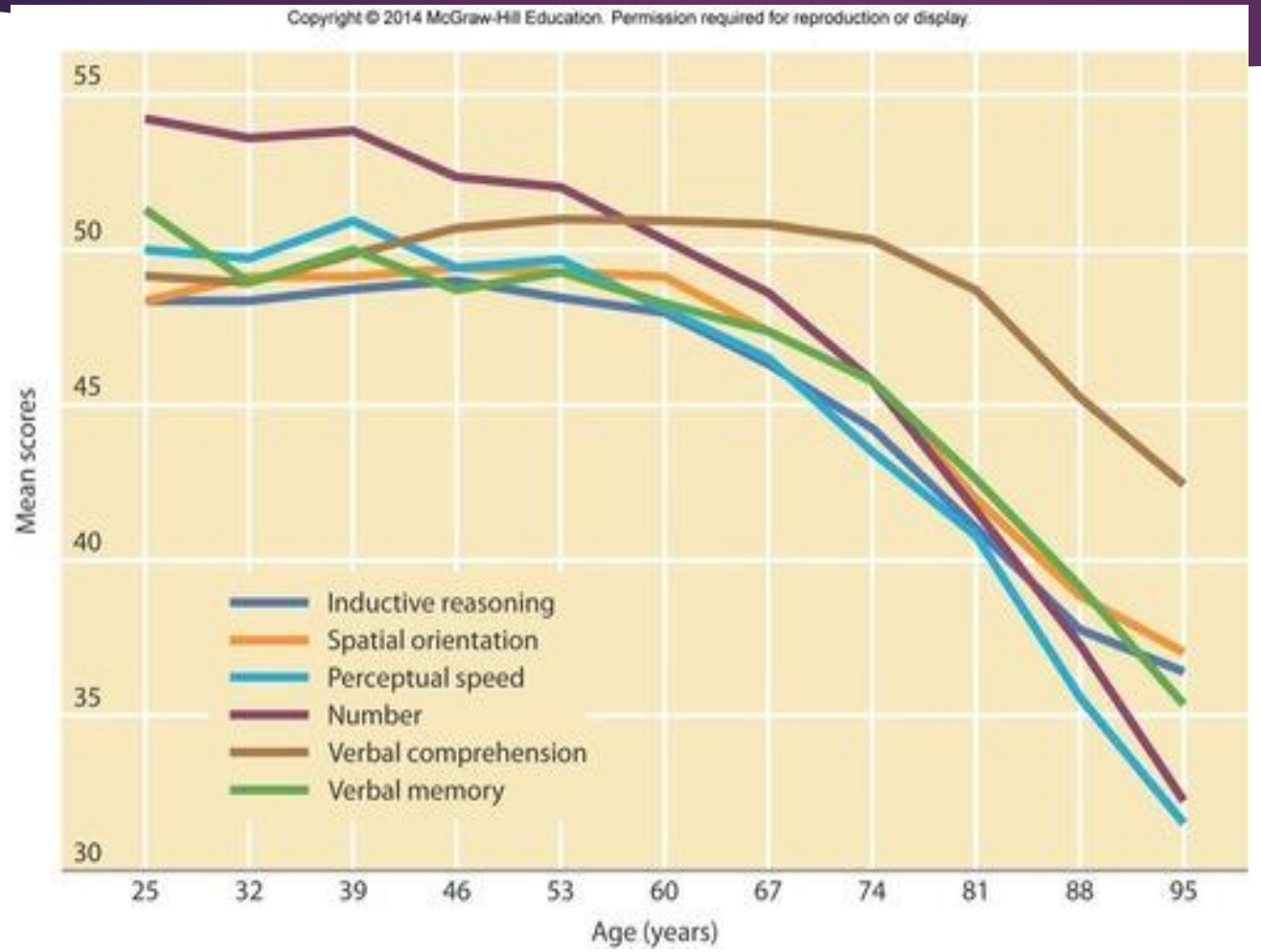
Hormone Optimization : Prohibited

- Survival Benefits
- Adaptive Benefits
- Recovery Benefits
- Regenerative Benefits
- Sense of well being, happiness, contentment

Health Span Curve



Cognition Span Curve



What's the answer?

- It takes a village
- Blurring of traditional roles
- Awareness of hyperbolic discounting

Defintions

- Structuralists
- Functionalists
- Functionaut
- Baronaut
- Regenaut

Concussion and Hyperbarics

ALLEN MEGLIN MD

ROBYN MEGLIN RN

Quiz: What is concussion?

Concussion quiz:
from https://concussioncareresources.com/concussion-care-quiz/
Which of the following is not considered a risk factor for concussion?
History of migraine
Male gender
Presence of a learning disability
History of a lazy eye

Quiz: What is concussion?

Concussion quiz:
from https://concussioncareresources.com/concussion-care-quiz/
Concussion can best be described as:
An injury that often results in an athlete having an abnormal CT scan
A disorder that almost never occurs in female athletes
A disorder that leads to disruption of brain physiology/chemistry
A disorder that almost always gets better in two weeks

Quiz: What is concussion?

Concussion quiz:
from https://concussioncareresources.com/concussion-care-quiz
Clearing a patient to return to activity after concussion:
Can be done by anyone who has administered the ImPact or Impact Pediatric test
Should be done if a patient reports no symptoms within 48 hours of the injury
Should be done only by a trained healthcare provider after reviewing the ImPACT and clinical reports in addition to other revelant medical data
Cannot occur before a 21-day period of rest

Quiz: What is concussion?

Concussion quiz:
from https://concussioncareresources.com/concussion-care-quiz/
Baseline test data is best described as:
Not useful for children under the age of 10
The best information to compare to the post-injury performance to determine the extent of injury
Likely not available when the child is injured
Difficult to obtain if the baseline and post-injury tests weren't conducted at the same organization

Quiz: What is concussion?

Concussion quiz:
from https://concussioncareresources.com/concussion-care-quiz/
Loss of consciousness:
Occurs in almost all concussions
Occurs in less than 10% of concussion cases
Is difficult to determine without a CT scan
Occurs more frequently in females than males

Concussion Reporting

- More than 50% are not reported
- 20% of high school athletes
- 1.7-3 million student athlete concussions per year
- Glascow Coma Score (13-15)
- **GCS** : eyes 4, motor 6, verbal 5
- **VOMS**- Vestibular Oculo-Motor Screening

What is concussion? Definitions

NIH: January 2023: Stat pearls

Definition Concussion:

“Traumatically induced transient disturbance of brain function."

Subset of TBI: mild TBI (mTBI) : Glasgow Coma Score of 13, 14, 15

Usually self limited, good prognosis, most symptoms completely resolve

Direct or indirect trauma (trauma elsewhere in body) with abrupt brain acceleration/deceleration

Types of Concussion: Presentation

- Cognitive
- Vestibular
- Ocular
- Migraine
- Neck problems/pain
- Mood/anxiety

Concussion Vulnerability

- Car sickness (vestibular)
- Migraines
- Anxiety Disorder (mood)
- Hx headaches (ocular)
- Cognitive (cognitive issues)
- Pre-existing C-spine conditions

Concussion: Second impact syndrome and CTE

SIS: second impact prior to **complete** healing resulting in acute, severe brain swelling and edema

Risk of brain herniation and death

CTE: Chronic traumatic encephalopathy : slow, progressive neurodegeneration due to repeated head trauma and tau protein deposition

Education essential to prevent chronic complications (delayed onset of symptoms, protection, return to play, fall prevention)

What is concussion? Clinical

- Less than 10% loss of consciousness
- Symptoms may not appear for hours to days after event
- **Affective/emotional function** (irritability, mood changes)
- **Cognitive function** (confusion, amnesia, fog, concentration)
- **Physical/somatic symptoms** (headache, dizziness, balance, visual)
- **Sleep** (drowsiness, more, less, difficulty)

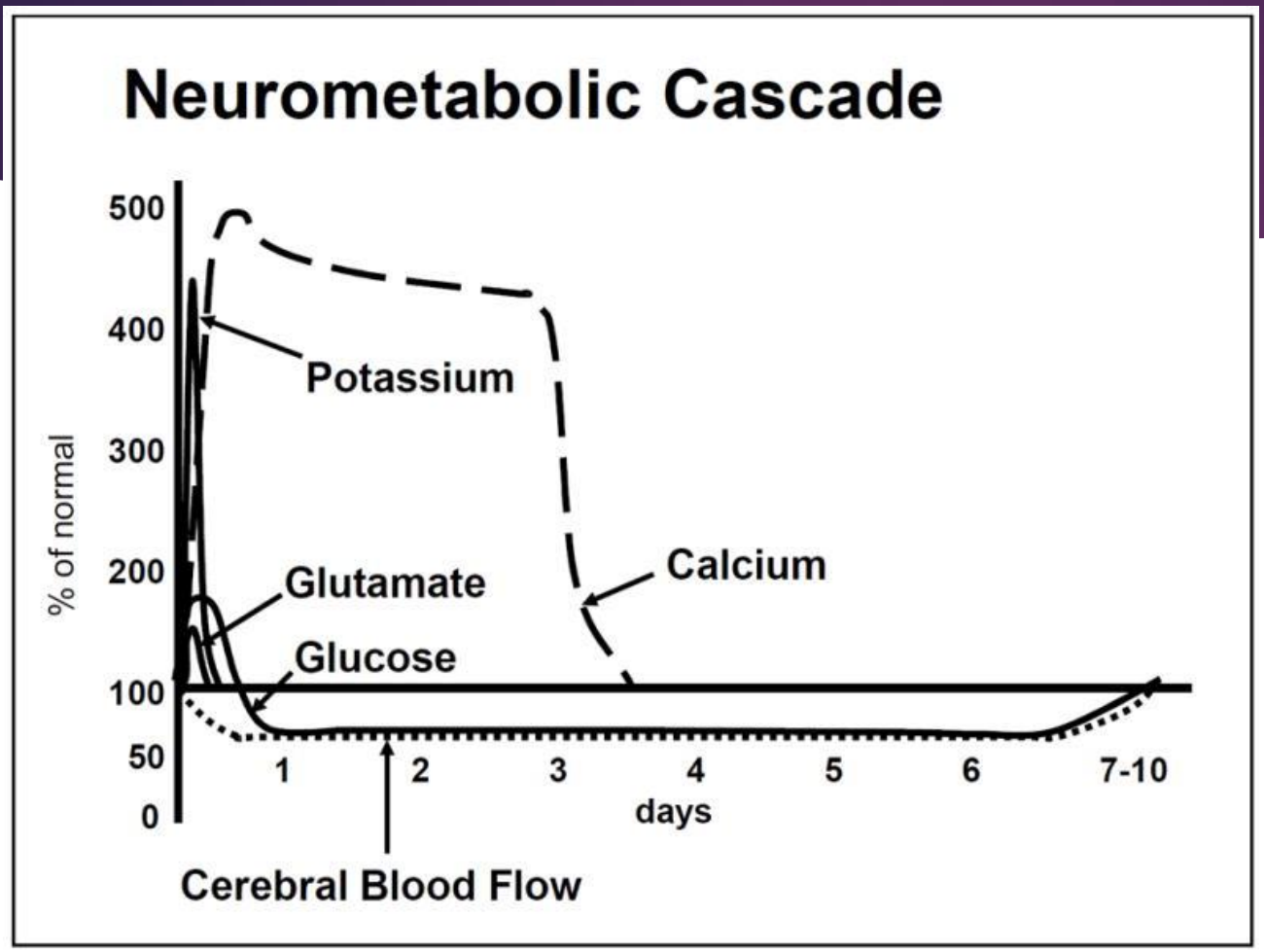
Traumatic Brian Injury: Athletes, Coaches, Trainers, DC

Fundamental questions:

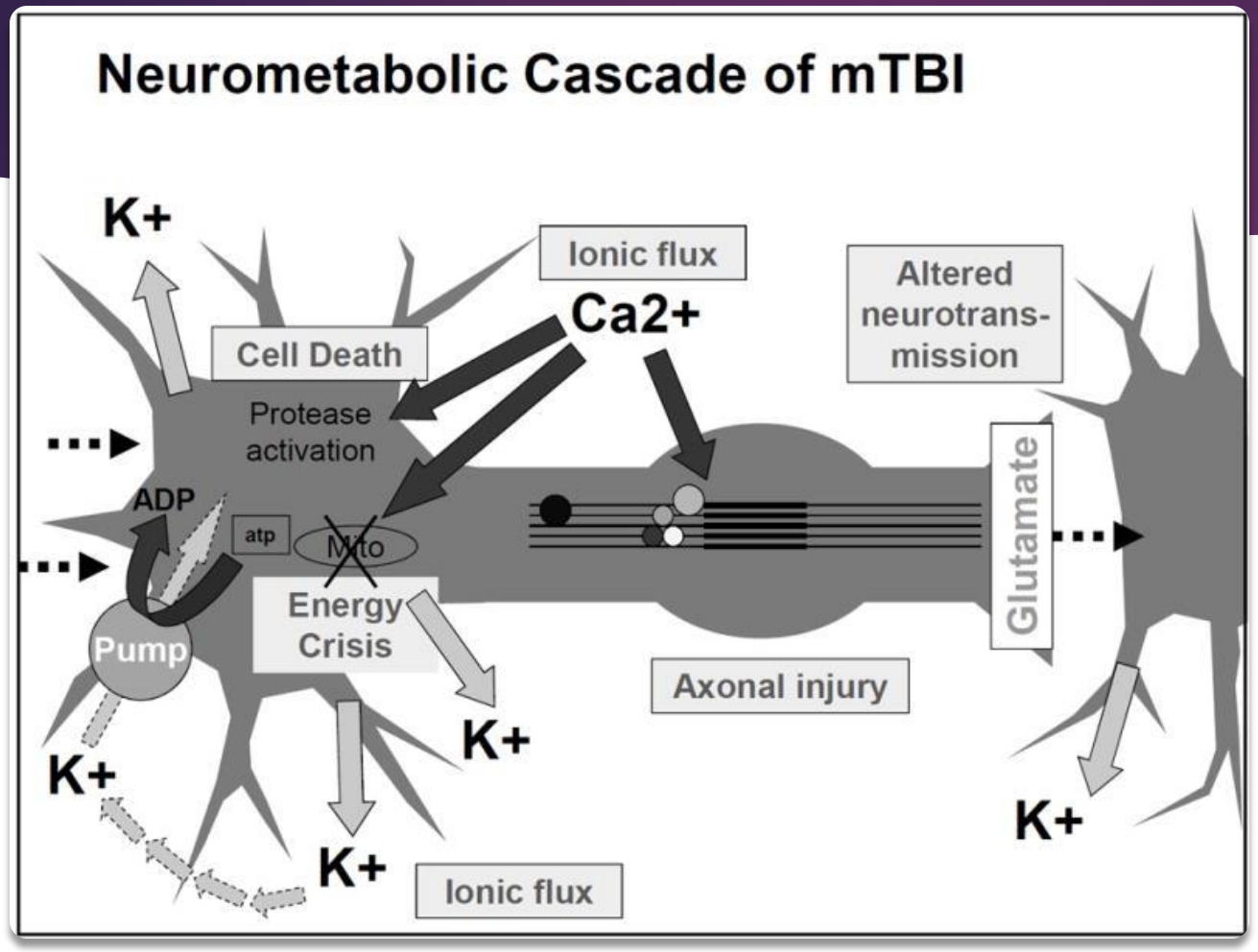
- What can be done to prevent concussion?
- When can I return to play?
- Can I accelerate return to play?
- What happens if I return too soon?
- What are the long term risks of concussion?

Concussion : ACUTE PHASE : Functional

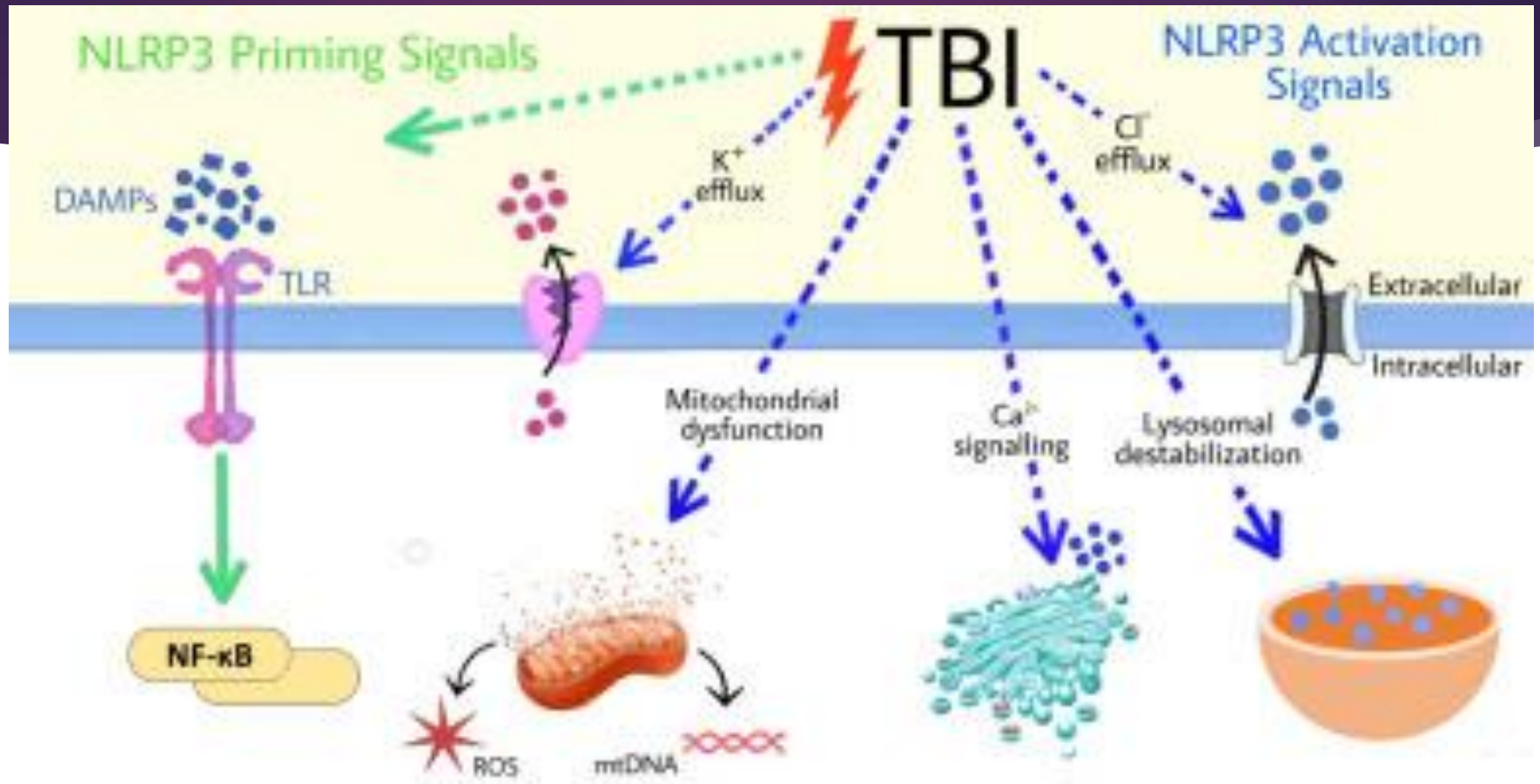
- Primary Injury related to forces applied: axonal stretch
- Ion channels open and depolarize (calcium)
- Spreading depression (depolarization)
- Release of calcium, myelin, calpain (protease)
- Synapses disrupted, neurochemical release
- Glutamate, acetyl choline
- Blood brain barrier disruption



Neurometabolic Cascade Concussion



Concussion at cellular level


NLRP3 Priming Signals
TBI
NLRP3 Activation Signals
DAMPs
TLR
K+ efflux
Cl- efflux
Extracellular
Intracellular
Mitochondrial dysfunction
Ca2+ signalling
Lysosomal destabilization
NF-κB
ROS
mtDNA

Concussion : Functional

Multiple systems within systems affected (visual, motor, auditory, cognitive)
Abrupt neuronal depolarization
Abnormal glucose metabolism
Excitatory neurotransmitter release
Altered cerebral blood flow
Disrupted axonal function
Each occurs concurrently or at different stages following the concussive event

Concussion: > 2 days post-injury event : structural changes

2 days, maximum 6-8 days, neurons, mostly interneurons die
Nissel bodies (Endoplasmic reticulum), Retraction balls
Wallerian degeneration
Activated Glial cells (microglia, astrocytes)
Microvascular injury, endothelial cell injury (oxygen delivery)
INFLAMMATION (cytokines, TNF, NF (kb), APP)

Concussion: Post Concussion Syndrome

- Longer recovery: PRIOR CONCUSSION. Second impact syndrome
- Predisposition and longer recovery: (neuroplasticity reserve)
- Pre-existing mood disorders
- Learning disorders
- Sleep disturbances
- Migraine headaches

Post Concussion Syndrome

- Persistent post concussion syndrome: up to 30%: symptoms more than 3 months
- **Permanent** post concussion syndrome in 15%. **> 3yrs, no recovery**
- Symptoms: headache > memory >concentration > balance
- Chronic: Anatomic injury with wounds to gray and white matter, ischemia, hypoxia, edema, vasospasm, release of neurochemicals, reperfusion injury, synaptic loss, nerve cell loss, glial cell loss, volume loss.
- Paradoxical psychiatric diagnosis : need for tissue repair

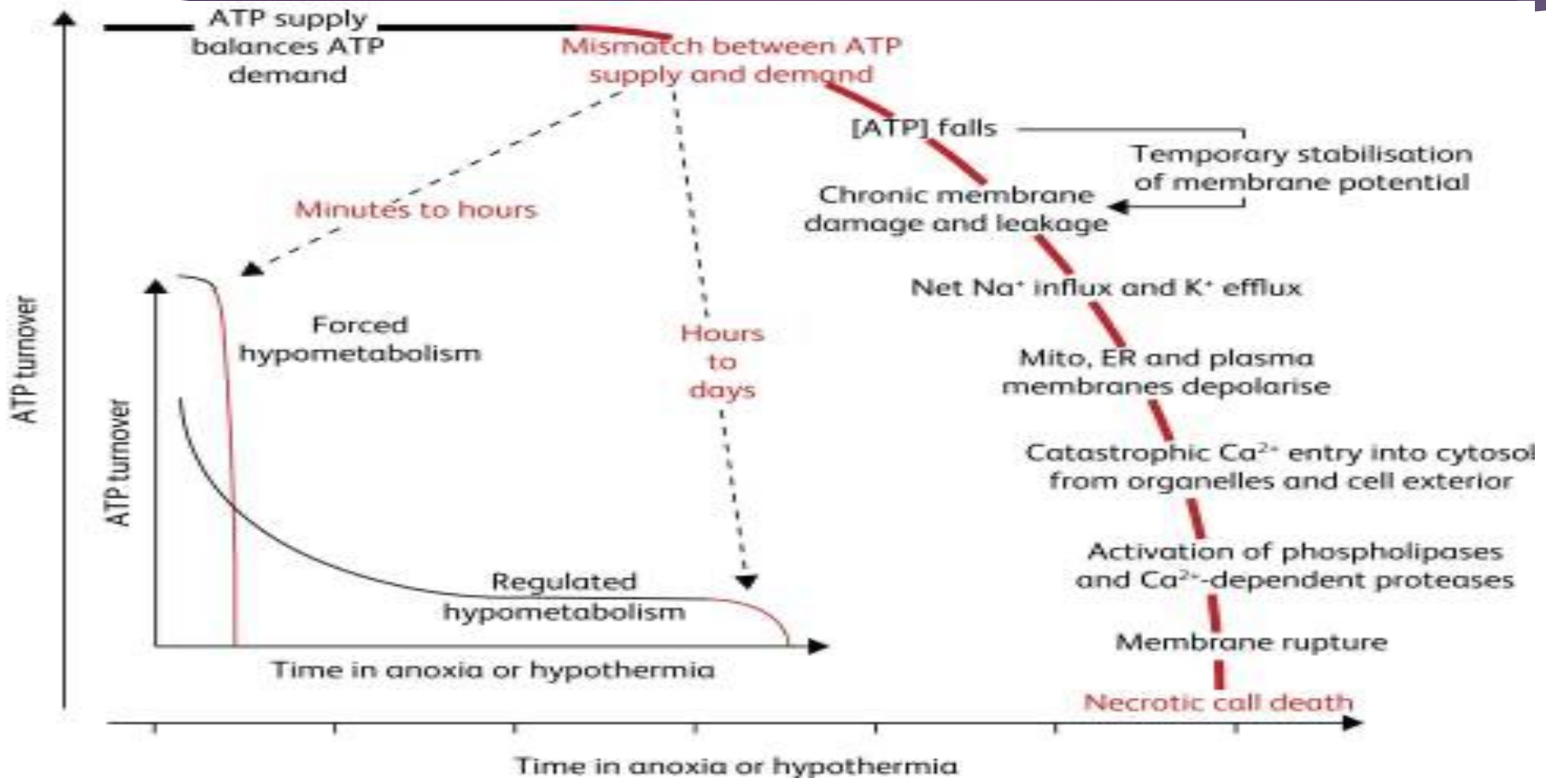
Pathophysiology Meets Symptoms

Post-TBI pathophysiology	Acute symptom / clinical correlate
Ionic flux	Migraine headache, photophobia, phonophobia
Energy crisis	Vulnerability to second injury
Axonal injury	Impaired cognition, slowed processing, slowed reaction time
Impaired neurotransmission	Impaired cognition, slowed processing, slowed reaction time
Protease activation, altered cytoskeletal proteins, cell death	Chronic atrophy, development of persistent impairments

The Cascade

- Ion Flux and glutamate release
- Energy crisis
- Cytoskeletal damage
- Axonal Dysfunction
- Altered Neurotransmission
- Inflammation
- Cell Death

Hypobaric Oxygen



Jet Lag

- Fatigue.
- Sleepiness.
- Digestive upsets.
- Impaired judgement and decision making.
- Memory lapses.
- Irritability.
- Apathy.

Traumatic Brian **Injury**: Athletes & Coaches, Trainers, DC

Fundamental questions:

- What can be done to prevent concussion?
- When can I return to play?
- Can I accelerate return to play?
- What happens if I return too soon?
- What are the long term risks of concussion?

Prevention: First Concussion Risks?

- Don't play collision sports
- No protective equipment or worn devices.
- Not helmets
- Not pads
- Not mouthpieces
- Not neck supports
- My answer : **Player resilience**

Brain Repair / Recovery: Good vs Evil

- P (LTS) = **F** (Synaptoclastic signaling)/ (Synatoblastic signaling)

Severity of injury

Ongoing Injury(inflammation),

Repetition of injury

Underlying Disease

Underlying Reserve (Provider)

Underlying Robustness of Repair

Bioenergetics (Mitochondria)

Brain Informatics (APOE4)

Time

Concussion Conclusions

Limit	Limit continued injury
Limit	Limit extension of injury by limiting inflammation
Limit	Limit cell death by adding energy and decreasing inflammation
Enhance	Enhance neuroplasticity to accelerate • Accelerate recovery and decrease vulnerable interval
Drive	Drive neural repair and neuron and supporting cell growth

Concussion : Recovery trajectory

Most resolve within 10 days if not additional injury

5th International Conference on Concussion in Sports: One month

Most reliable predictor is severity of symptoms first few days

Every concussion is different, highly individualized (reserve)(healing mechanisms)

Prevention: First Concussion Risks?

- Don't play collision sports
- No protective equipment or worn devices.
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TOP BIOLOGIC FUNCTIONS AFFECTED BY HBOT

Cellular growth and proliferation	40.9
Cell death	39.1
Gene expression	33.8
Cellular development	18.1
Cell morphology	16.0

Prevention: First Concussion Risks?

- Don’t play collision sports
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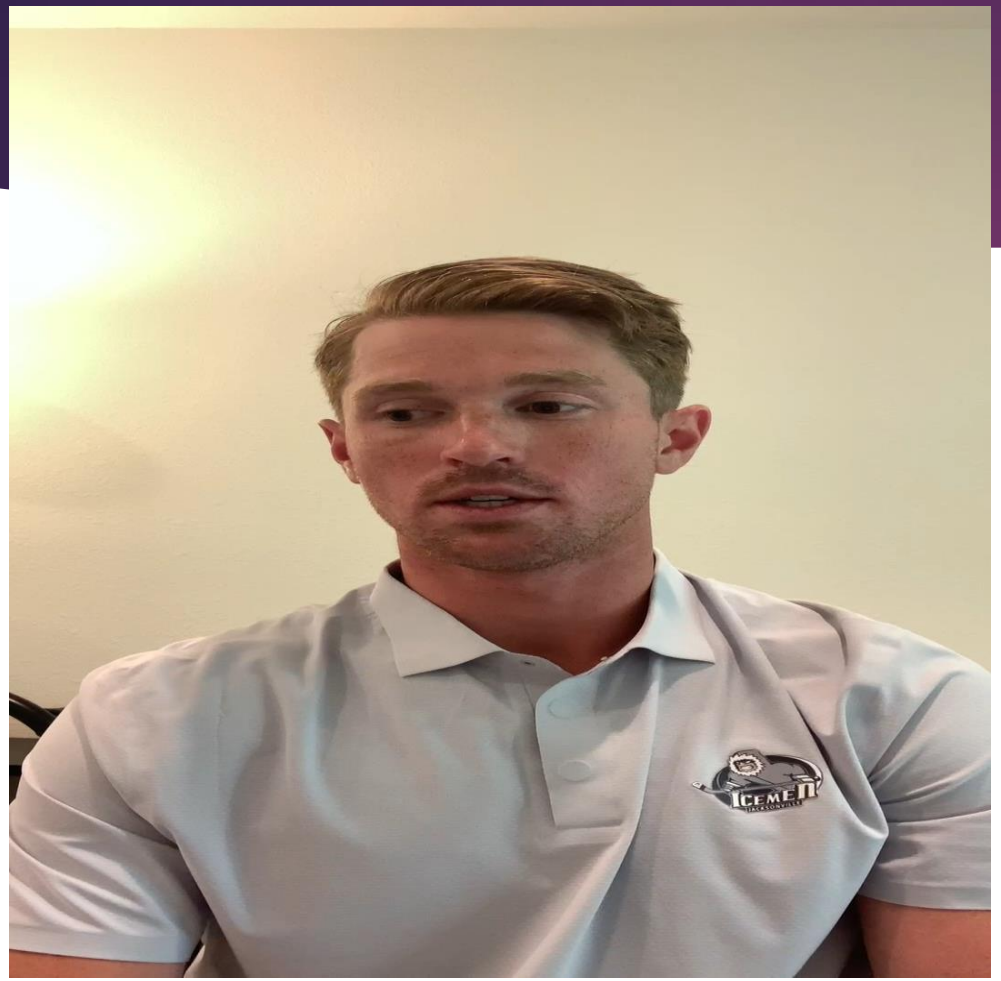


Personal Experience HBT : Chris Brown

HBT Acceptance Trial (HAT): ECHL

- HAT……What is the trick for the ECHL? **(THE HAT TRICK)**
- Team Captain
- Trainer
- Results

Echl HAT Trial

- **Questions asked:**
- Would there be acceptance by management, medical staff, trainer, players?
- Are there safety issues with creating **Baronauts**? Trainers? Players?
- Viable on the road?
- Equipment issues/ mechanical failures?
- Regulatory issues? Liability issues?
- Business model viability?
- Was it helpful?

HAT: Player Questionnaire

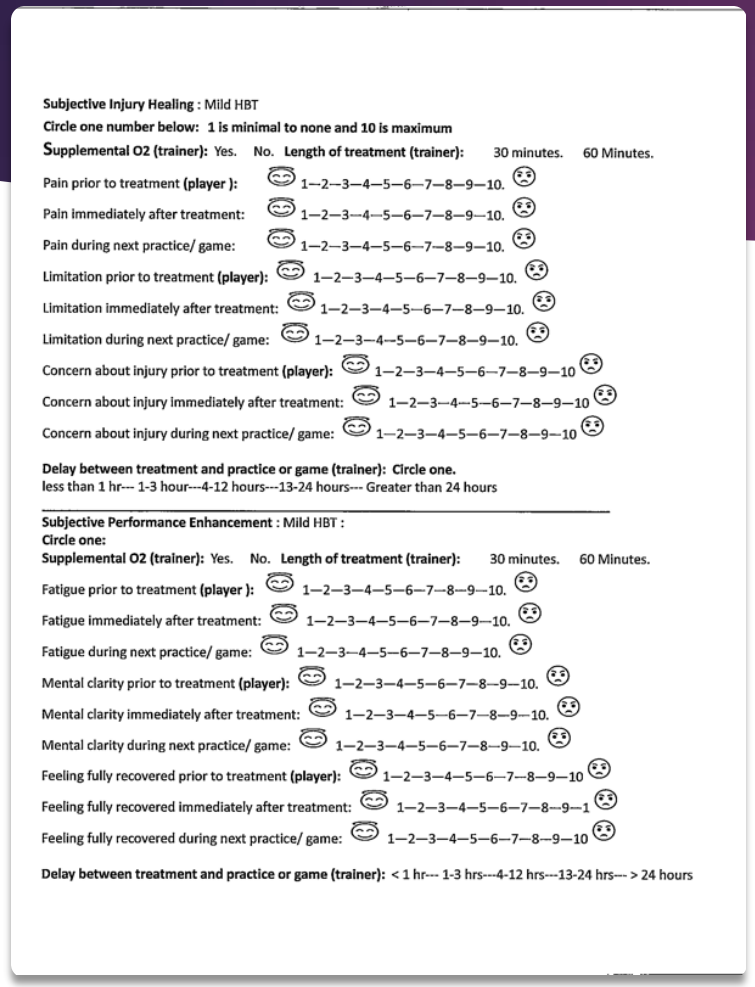
Questions to assess injury healing:

1. Pain prior to and after treatment?
2. Limitation prior to and after treatment?
3. Concern about injury prior to and after treatment?

Questions to assess performance enhancement

1. Fatigue prior to and after treatment?
2. Mental clarity prior to and after treatment?
3. Feeling fully recovered prior to and after treatment?

HAT : Injury and Recovery



Subjective Injury Healing : Mild HBT
Circle one number below: 1 is minimal to none and 10 is maximum
Supplemental O2 (trainer): Yes. No. **Length of treatment (trainer):** 30 minutes. 60 Minutes.
Pain prior to treatment **(player):** 1—2—3—4—5—6—7—8—9—10.
Pain immediately after treatment: 1—2—3—4—5—6—7—8—9—10.
Pain during next practice/ game: 1—2—3—4—5—6—7—8—9—10.
Limitation prior to treatment **(player):** 1—2—3—4—5—6—7—8—9—10.
Limitation immediately after treatment: 1—2—3—4—5—6—7—8—9—10.
Limitation during next practice/ game: 1—2—3—4—5—6—7—8—9—10.
Concern about injury prior to treatment **(player):** 1—2—3—4—5—6—7—8—9—10
Concern about injury immediately after treatment: 1—2—3—4—5—6—7—8—9—10
Concern about injury during next practice/ game: 1—2—3—4—5—6—7—8—9—10

Delay between treatment and practice or game (trainer): Circle one.
less than 1 hr--- 1-3 hour---4-12 hours---13-24 hours--- Greater than 24 hours

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Subjective Performance Enhancement : Mild HBT :
Circle one:
Supplemental O2 (trainer): Yes. No. **Length of treatment (trainer):** 30 minutes. 60 Minutes.
Fatigue prior to treatment **(player):** 1—2—3—4—5—6—7—8—9—10.
Fatigue immediately after treatment: 1—2—3—4—5—6—7—8—9—10.
Fatigue during next practice/ game: 1—2—3—4—5—6—7—8—9—10.
Mental clarity prior to treatment **(player):** 1—2—3—4—5—6—7—8—9—10.
Mental clarity immediately after treatment: 1—2—3—4—5—6—7—8—9—10.
Mental clarity during next practice/ game: 1—2—3—4—5—6—7—8—9—10.
Feeling fully recovered prior to treatment **(player):** 1—2—3—4—5—6—7—8—9—10
Feeling fully recovered immediately after treatment: 1—2—3—4—5—6—7—8—9—1
Feeling fully recovered during next practice/ game: 1—2—3—4—5—6—7—8—9—10

Delay between treatment and practice or game (trainer): < 1 hr--- 1-3 hrs---4-12 hrs---13-24 hrs--- > 24 hours

HAT: Player Questionnaire

Questions to assess injury healing:

1. Pain: 4.2 to 2.8 to 2.2
2. Limitation: 8 to 7.3 to 2.2
3. Concern: 3.8 to 2.9 to 1.4

Questions to assess performance enhancement

1. Fatigue: 4.9 to 3 to 2.4
2. Mental clarity: 4 to 2.2 to 2.1
3. Feeling fully recovered: 5.1 to 3 to 2.4

HAT: Player questionnaire results

- Conclusions:
- Everything was improved
- Overall trend was to decrease symptoms and concerns by around half

Immediate Improvement: Feeling recovered >Fatigue >Mental Clarity>Pain

Delayed Improvement: Limitation > Recovered > Fatigue > Concern

Most profound effect: Limitation

Next studies will compare HBT to no HBT (time, trainer, routine care)

NHL medical directors:

- In 2022, 25 teams listed head team physicians
- Orthopedics 18
- Family practice 2
- ER Medicine 1
- Physical Therapy 1
- Emergency Medical Technician 1
- Unknown 2

Blue Zone : Lifestyle Interventions

- Physical activity beyond age 80
- Life purpose
- Downshift
- 80% rule
- Plant slant
- Wine at 5
- Belong
- Loved ones first
- Right tribe

Brain Health and Neuroplasticity

Gaseous Neurotramsmitters

- **Gasotransmitters**
- Nitric oxide
- Carbon monoxide
- Hydrogen Sulfide

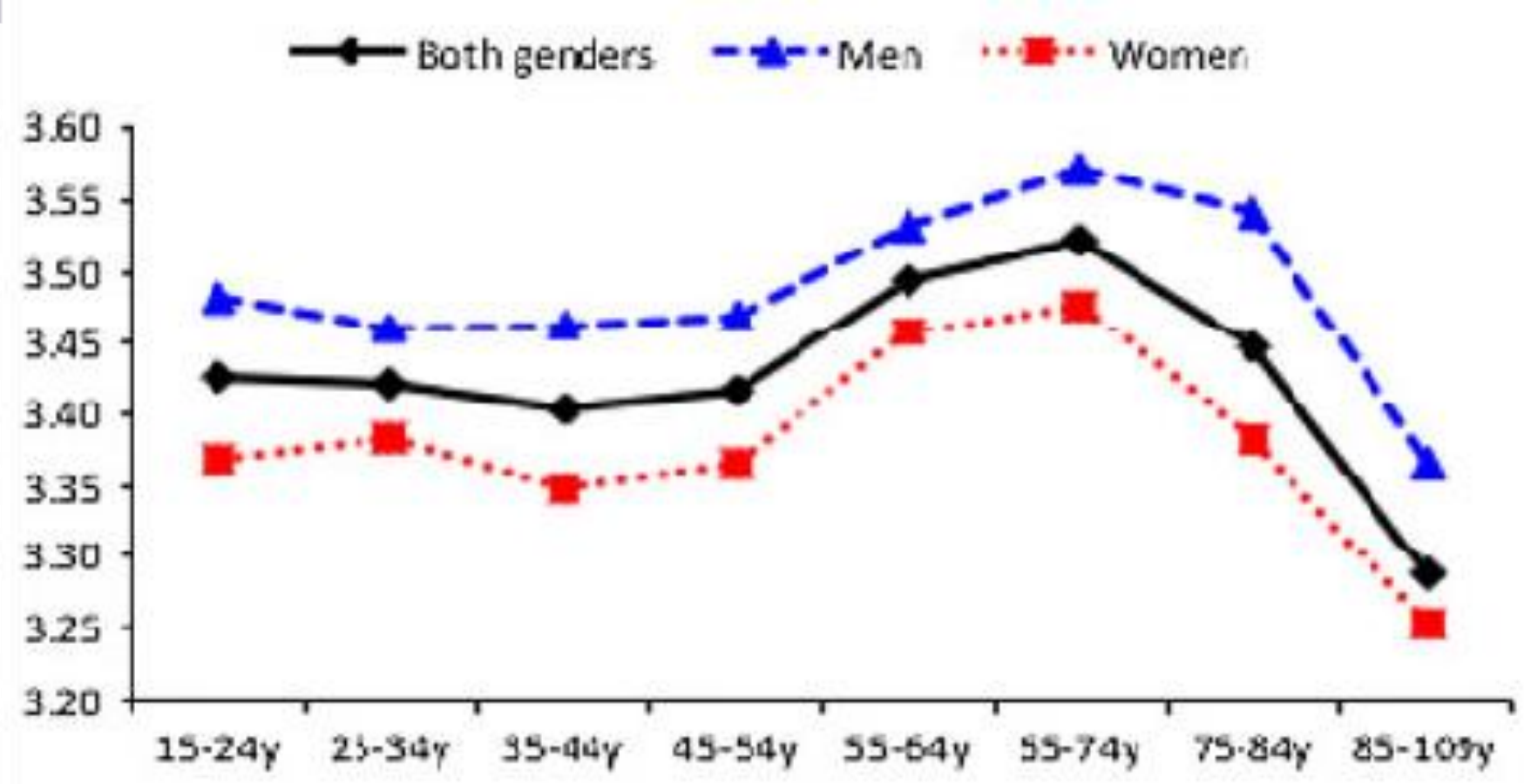
Syllogism: Two talks, One Conclusion

- **Major Premise:** Medicine 2.0 has done a great job with acute illness, but it fails chronic illness and complex disease. It looks towards normal and away from optimization.
- **Minor Premise 1:** It is now timely to address chronic and complex disease. Health-span, aging, lack of optimization, attainment of wellness can be considered chronic or complex processes.
- **Minor Premise 2:** There is near infinite resistance to change due to stakeholders who are rooted in Medicine 2.0
- **Conclusion: We are going to have to blur boundaries, offer mutual acceptance, work as team to take it to higher levels**

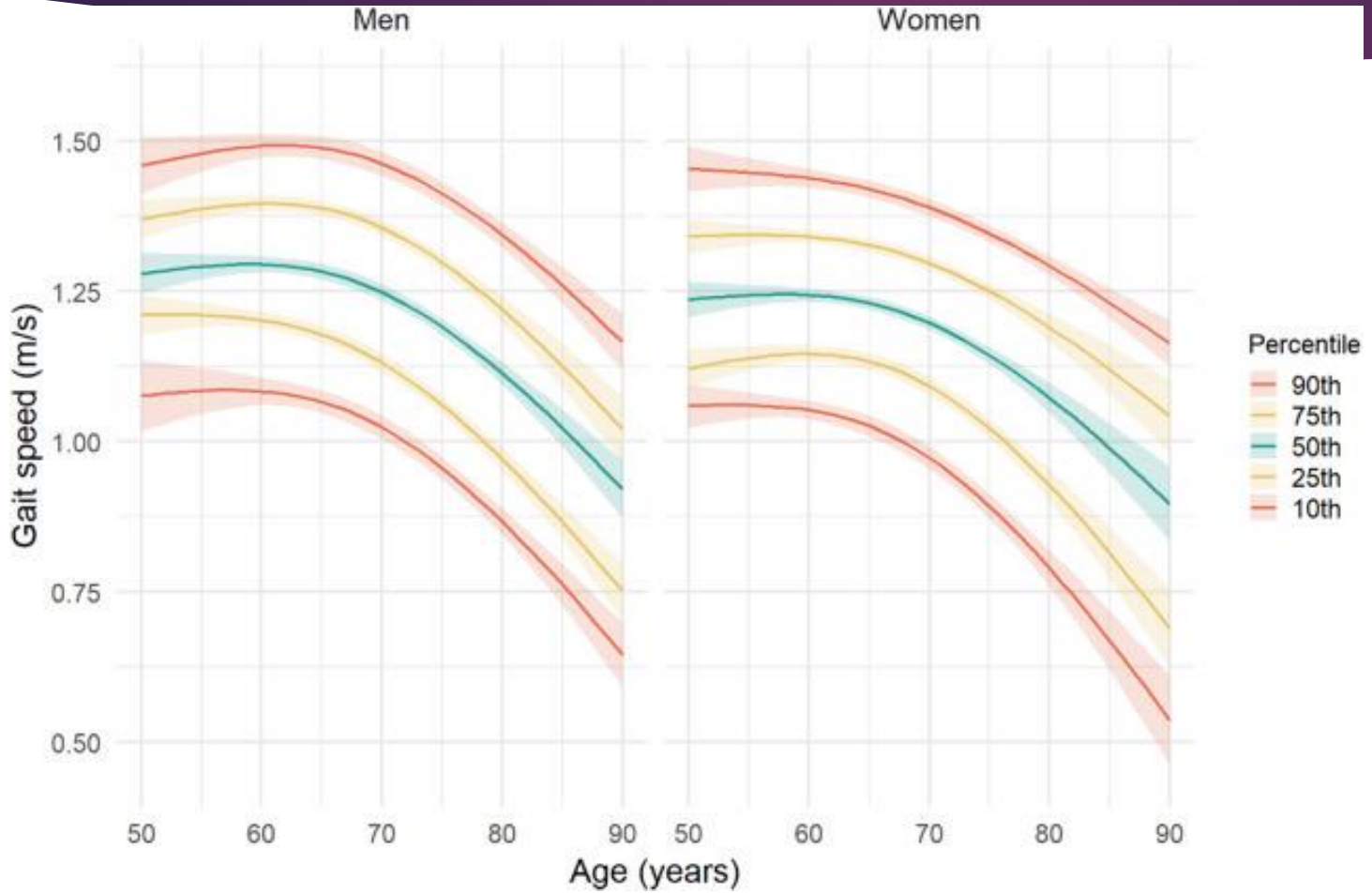
I went to medical school

- To prevent pain and suffering, not react to it
- Conventional Medicine = Medicine 2.0 (Peter Atilla)
- Moving towards Medicine 3.0 and this is going to take all of us

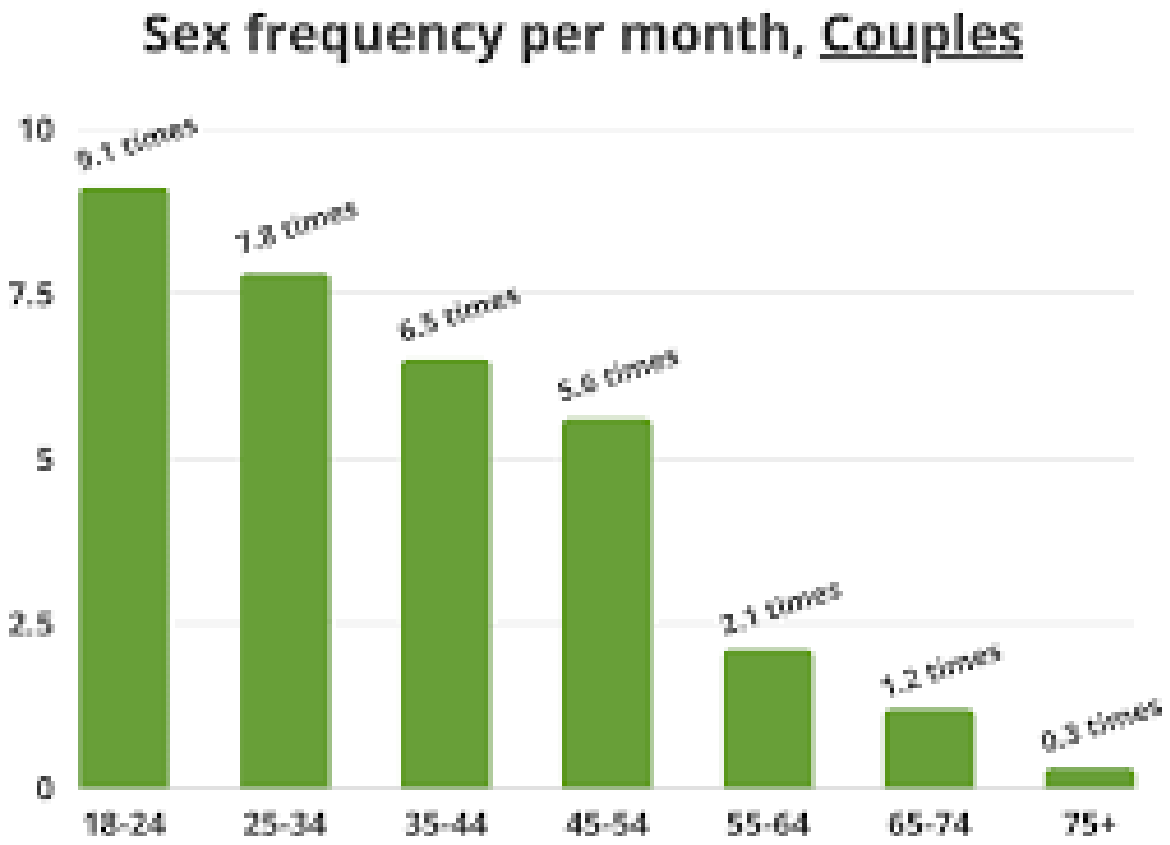
Mental Health Span



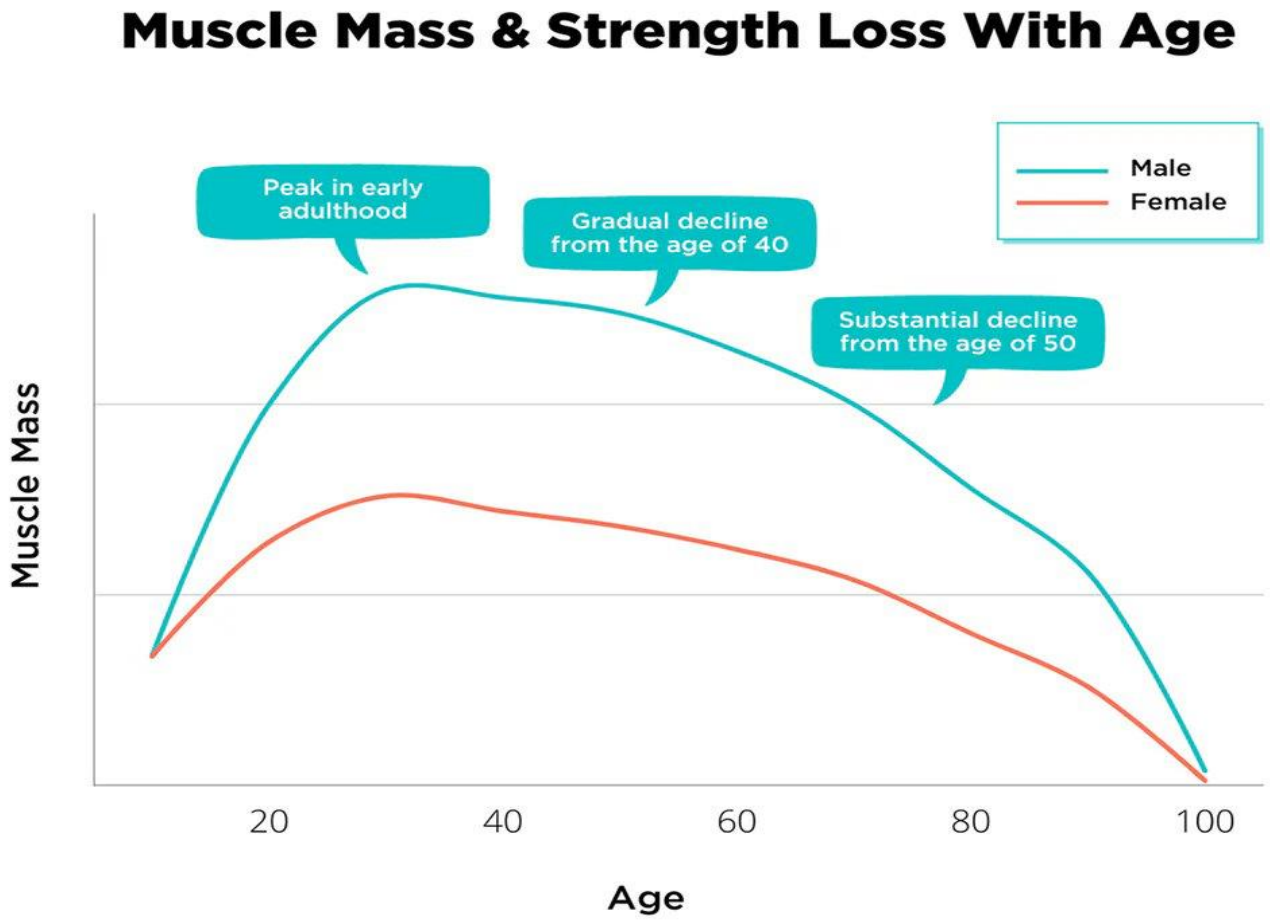
Mobility Span : Gait speed



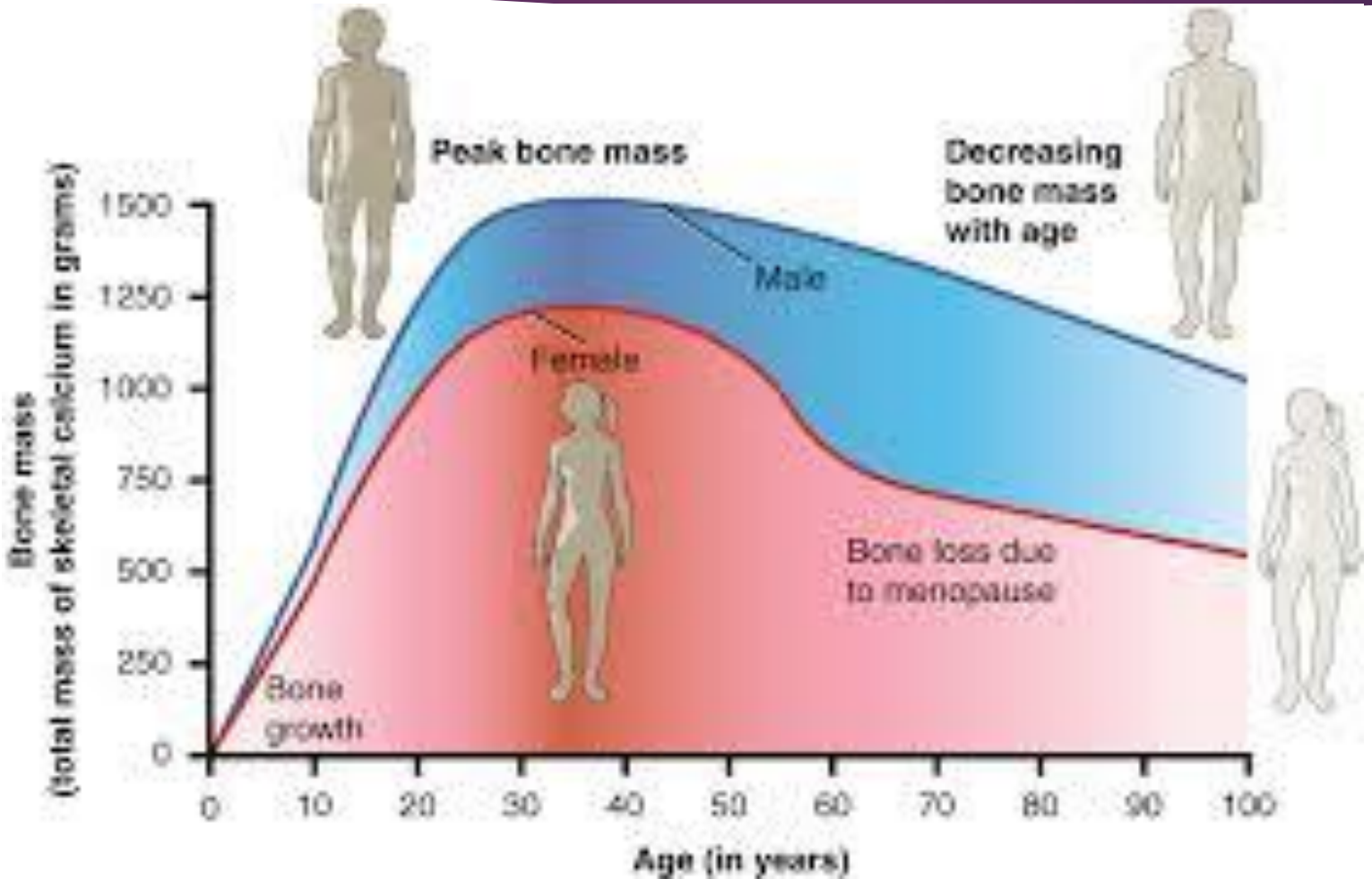
Sex Span Curve



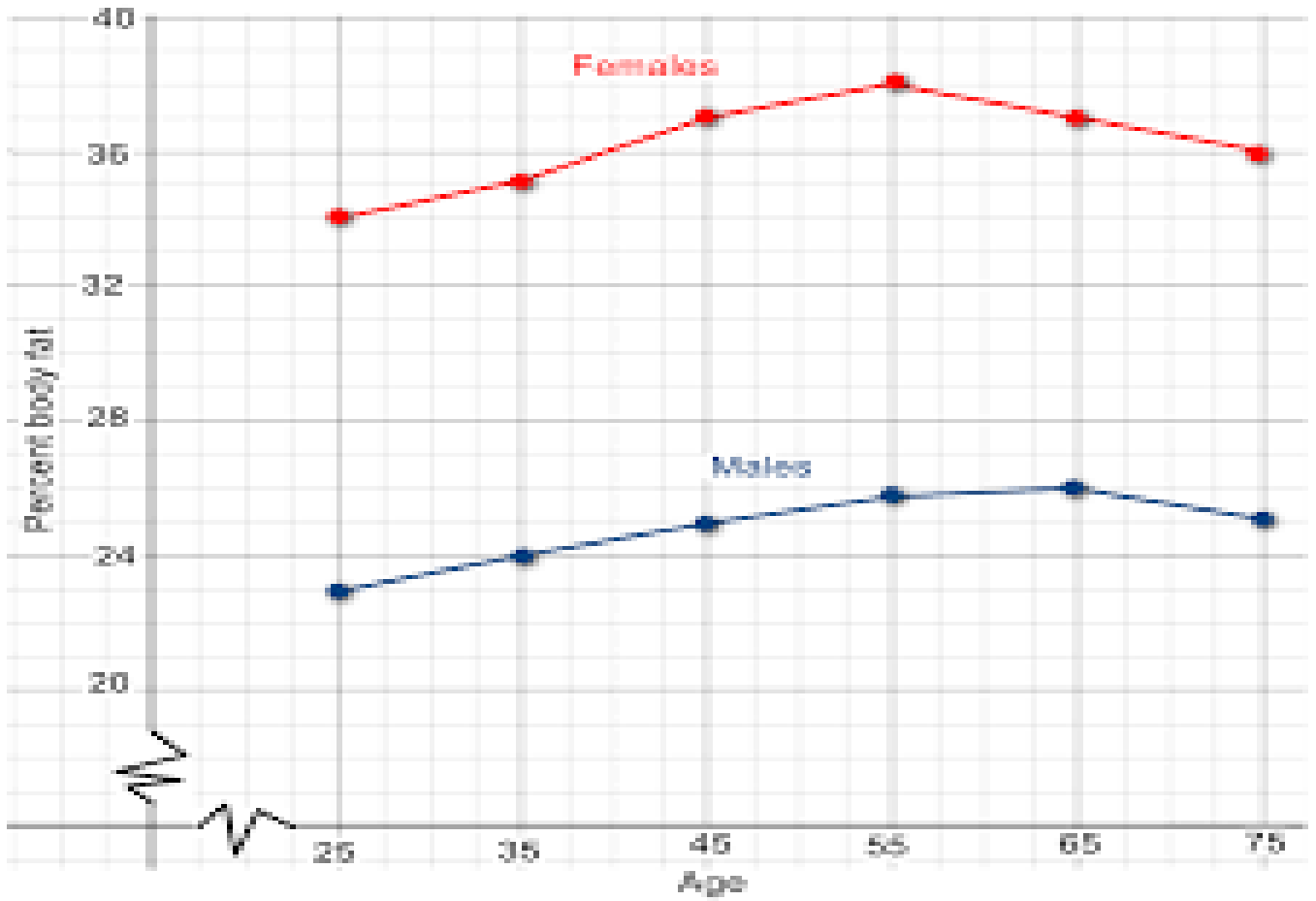
Muscle Span


Muscle Mass & Strength Loss With Age
Peak in early adulthood
Gradual decline from the age of 40
Substantial decline from the age of 50
Male
Female
Muscle Mass
20
40
60
80
100
Age

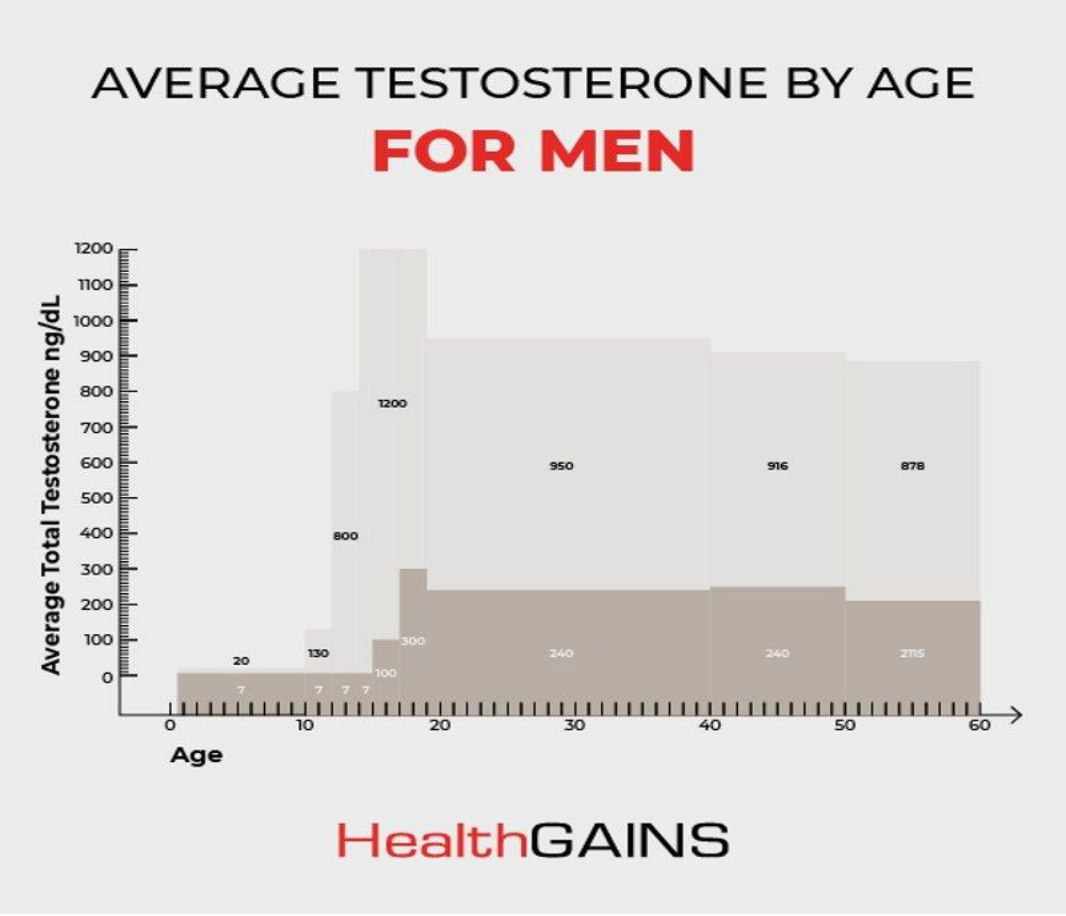
Bone Span Curve

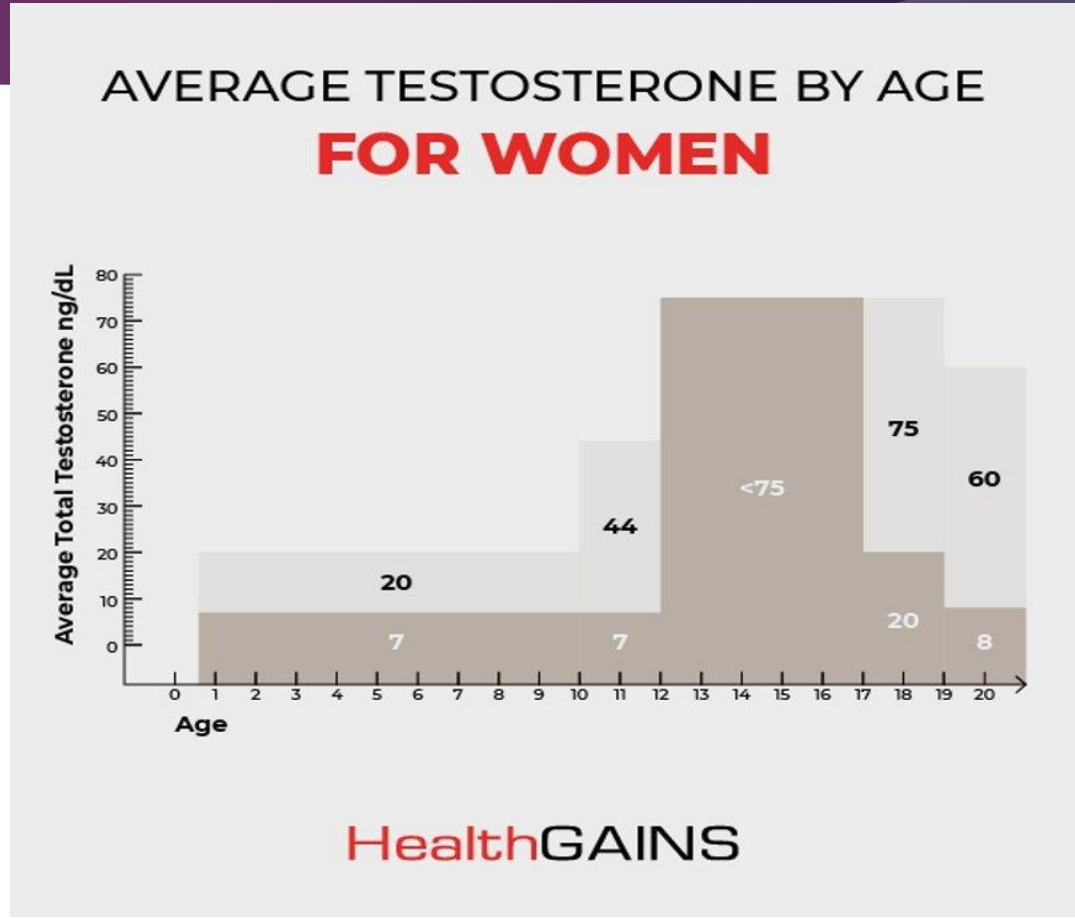


Fat Span

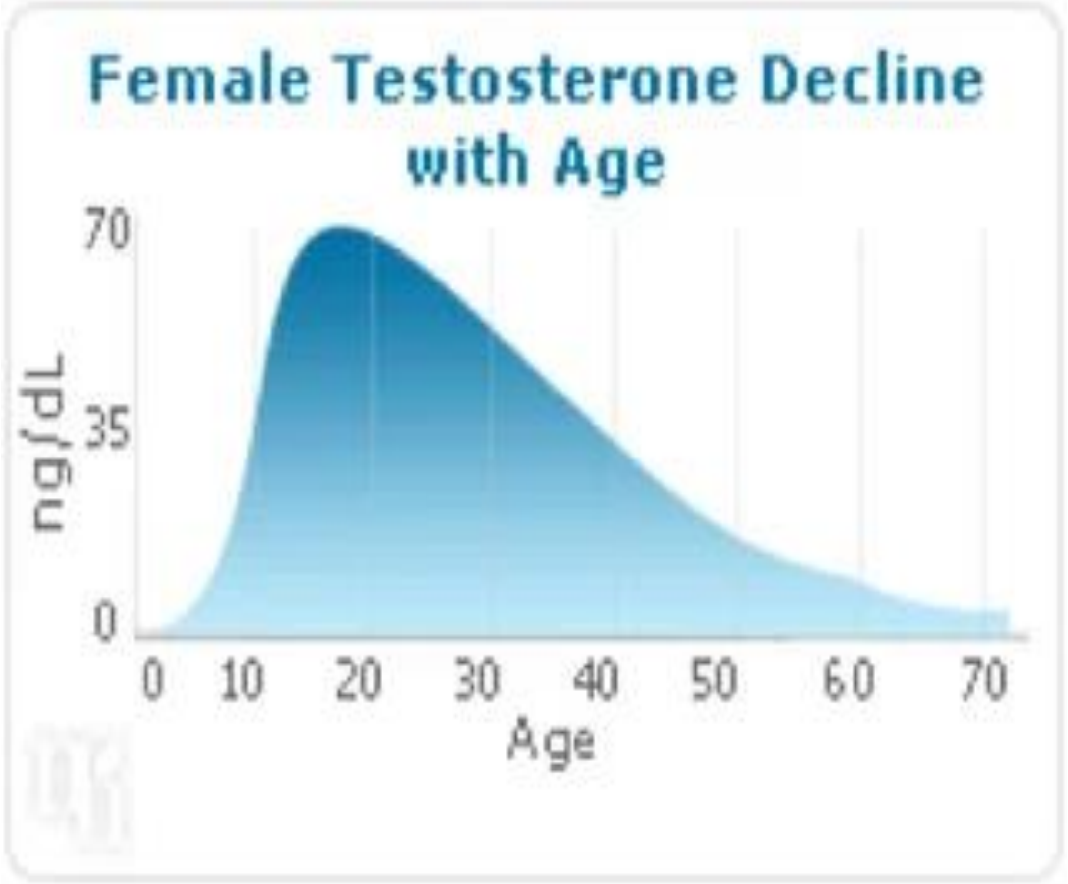

40
36
32
28
24
20
Percent body fat
Females
Males
25
35
45
55
65
75
Age

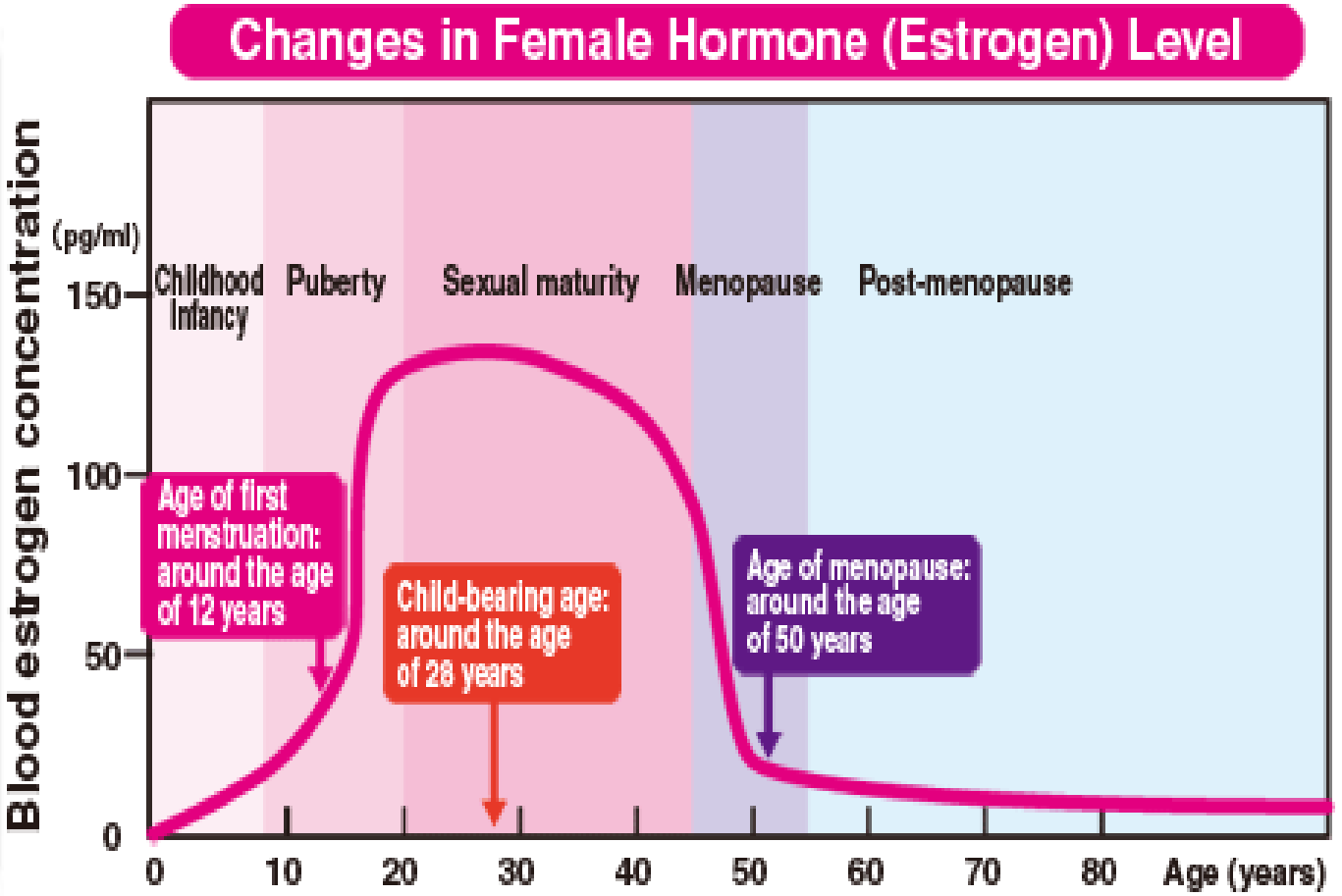
Testosterone curve





Sex Hormone Endocrine Span





Blue Zones : defined by Dan Buettner

- Sardinia, Italy
- Ikaria, Greece
- Nicoya Peninsula, Costa Rica
- Okinawa, Japan
- Loma Linda, California

Live Your Best Life Now

ALLEN MEGLIN MD

ROBYN MEGLIN RN

Fat Loss

THE METABOLOMICS CENTER

Wellness for Women (mostly)

ALLEN MEGLIN MD